ENERGY

AFFECTED ENVIRONMENT

Introduction

Seattle City Light (SCL) serves Downtown customers with an underground network system fed by three substations. This system is known as the Downtown Network. Many of the region's largest businesses and governmental operations depend on the highly reliable power supply from the network system, and certain new businesses consider this reliability when deciding where to locate. Downtown electrical load has continued to grow over the last several years.

Description of the Downtown Network

The Downtown Network serves the Downtown area between Denny Way and S. King Street, plus a dozen other blocks north of Denny Way in the Aurora/Broad Street and Fairview Avenue vicinities. This is a 1.2-square mile area. The Downtown Network accounts for approximately 10% of total system load. Three distribution substations located at Broad Street, Union Street and S. Massachusetts Street serve this area. The Downtown Network is connected via transmission lines and 142 circuit miles of feeder lines. The network is designed to provide highly reliable electric power by means of a complex system of multiple power-supply cables, transformers and network protectors to each customer. This reliability is highly desired in a Downtown core area and is more costly to build, operate and maintain. In recognition of this, several years ago a separate electric rate was established for medium and large commercial customers served from the Downtown network.

Downtown Demand and Substation Capacity

The current peak demand in Downtown is approximately 260 MVA. Summer and winter peak demands are comparable. Commercial customers account for approximately 95% of energy sales in the Downtown service area.

A report by R.W. Beck titled "Downtown and First Hill Load Analysis" was published in March 2002. Based on a revised load forecast, the report states that "a new substation serving the Downtown network must be energized by 2012 in order to provide for a service need date of 2015." This study assumed a load growth throughout the Downtown network area of 2% per year and identifies factors that could accelerate or delay the date the substation is needed (such as greater-than-expected "large loads").

Seattle City Light has currently embarked on a comprehensive Capacity Plan to identify improvements to the transmission and distribution systems that may be needed to meet the load growth requirements in the entire Seattle City Light service area. Included in that effort will be a review of the 2002 R.W. Beck report. Seattle City Light will pursue the recommendations that result from the Capacity Plan, including those relating to the Downtown area. This Capacity Plan will be completed by the end of 2004.

In the near term, City Light is performing work that will maximize the available substation and distribution feeder capacities. Capacity work is being phased in by re-conductoring feeders using larger cables, balancing and redistributing feeder loads between neighboring substations, increasing some network capacities, and adding a small amount of transformer capacity at an existing substation. City Light is also promoting load management to reduce loading of the existing Seattle City Light system. This work will result in maximum capacity for the network feeder cables that best utilizes the substation capacity available from the three existing substations.

Economic development and its impact on the electrical system will be regularly and closely monitored. If loads ramp up or the request for large loads happens sooner than presently projected, the need for infrastructure will accelerate. Ultimately as development and loads ramp up over time, additional substation and distribution capacity will be needed and a new Downtown substation and associated distribution feeders will be built.

HIGH ENERGY DEMANDING USES

The economic boom of the late 1990s and early 2000 spurred greater demand for electricity to serve "wired" offices, laboratories, and concentrations of computers and telecommunications equipment. "Server farms" or "server hotels" are an emerging category of high-tech use that concentrates many computer servers into a hub that handles computer and telecommunication traffic and business data processing needs. These uses have few employees but very large energy demands, up to 150 watts per square feet, many times more than typical commercial energy demands. Air conditioning to prevent equipment overheating is a key need, as is highly reliable power to prevent interruptions of service. In 1999 and 2000, there was much competition to develop server farms, and several projects were pending or contemplated.

During 2000 and 2001, however, the high-tech and telecommunications sectors experienced rapid changes that dramatically altered future expectations for those sectors as well as the overall national and regional economy. Numerous local high-tech business ventures failed, resulting in vacation of office space and significant implications for local real estate leasing and development. Added to this were further economic challenges of an earthquake, a regional drought and an energy crisis. These economic factors combined to delay or cancel the development of several "server hotels" and high-tech-oriented office projects.

Predicting future energy use in this context is difficult. Future growth in energy consumption will relate to the regional economy, including the rather volatile high-tech economic sectors, and the pace of new real estate development. Economic challenges may continue to limit demand for new facilities oriented to high-tech uses over the next year or two. However, future energy projections should bear in mind the large energy demands of individual "server hotels" (see the Impacts section below for further discussion) and the significant energy demands of large or high-rise buildings primarily dedicated to high-tech office and/or bio-tech uses.

Downtown System Plans and Policies

NETWORK STRATEGIC SYSTEM PLAN

City Light's Network Strategic System Plan (September 2000) addresses planned system upgrades to increase system capacity, reliability and safety. It presents a Capital Improvement Plan for the network including approximately $20 million annually for network additions and new service, rebuilding of vaults, and improvements to increase feeder capacity at the substations.

LARGE LOAD ORDINANCE

In October 2001, the City Council adopted a "large load ordinance" that defined a new rate class for New Large Loads to help recover some of the additional costs to City Light to serve large energy users. A large load is defined as "any service fed from an expanded or a new installation equal to or greater than 12.5 MVA energized capacity installed within any consecutive 5-year period." The ordinance notes that the Pacific Northwest Power Planning and Conservation Act requires the Bonneville Power Administration to set higher prices for electricity provided to customers "whose consumption of electricity increases by more than 10 average MW over any consecutive 12-month period." The ordinance

allows City Light to recover the incremental costs for transmission, distribution, capacity, administration, and mitigation of greenhouse gas emissions associated with energy production.

SUSTAINABLE BUILDING POLICY

On February 22nd, 2000 the Seattle City Council unanimously approved the Sustainable Building Policy that is part of the City's Environmental Management Program (EMP). The Office of Sustainability and Environment (OSE) guides City governmental operations toward sustainability by coordinating implementation of Seattle's Environmental Management Program and the Mayor's Environmental Strategy. The mission of the EMP is to foster the City's compliance with environmental laws, assist departments to reduce environmental impacts from operations, and improve environmental performance.

The purpose of a Citywide policy on sustainable building is to:

demonstrate the City's commitment to environmental, economic and social stewardship;
yield cost savings to the City taxpayers through reduced operating costs;
provide healthy work environments for staff and visitors;
contribute to the City's goals of protecting, conserving and enhancing the region's environmental resources; and
help set a community standard of sustainable building.

The City of Seattle's Sustainable Building Policy is tied to a "green building" rating system known as LEED[1], developed by the US Green Building Council (USGBC). LEED is a self-certifying system designed for rating new and existing commercial, institutional and high-rise residential buildings. Different levels of green building certification (Certified, Silver, Gold, Platinum) are awarded based on the total credits earned in each of several categories: site, energy, material resources, indoor environmental quality and water.

To date, a total of 12 City of Seattle new development and renovation projects (totaling 2.7 million square feet) are expected to meet or exceed the "Silver" LEED Standard. Examples include the City's Justice Center, City Hall, Downtown Library, McCaw Performance Hall and Key Tower remodel. The 12 projects are expected, on average, to exceed ASHRAE/IESNA[2] standards by 24 percent. Using a baseline energy consumption of 15/KwH/sf/yr for an average office building, this can be estimated to result in a reduction of energy use of 10,000 KwH/year, saving the City an estimated $491,000 annually. The City's internal policy requires a minimum of a 20% efficiency increase over ASHRAE standards. Most of the City's projects have exceeded this requirement, in some cases achieving up to a 40% increase in energy efficiency. A monitoring and evaluation program is planned for the City's LEED projects once they are completed, in order to track actual savings.

In Council Resolution 30280, Seattle City Council asked for "possible steps and measures for the City to require or provide incentives to developers of commercial buildings to meet the Silver LEED standard by 2003." A full report was given to Council with recommendations on sustainable building incentives as well as other issues outlined in the resolution.

In addition, the Resolution directed DCLU with support from City Light to propose "*Energy Code amendments options for amending the Seattle Energy Code to achieve energy savings up to 20% beyond the current…ASHRAE and…IESNA energy efficiency requirements for nonresidential buildings: ASHRAE/IESNA Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.*"

[1] LEED is a trademark and abbreviation for "Leadership in Energy and Environmental Design."
[2] ASHRAE/IESNA refers to the American Society of Heating, Refrigerating and Air-Conditioning Engineers and the Illuminating Energy Society of North America.

In September 2001, the City Council adopted and the Mayor signed Ordinance 120525 containing revisions to the Seattle Energy Code for nonresidential buildings. These revisions will achieve estimated energy savings of 15-20% compared to the baseline in ASHRAE/IESNA Standard 90.1-1999.[3]

"GREEN" POWER

In 2001, the State Legislature passed a new law to allow customers to partner with their electric utility to purchase new clean, renewable energy sources. Seattle City Light responded by creating "Seattle Green Power" whereby any customer can make voluntary payments that will go toward building and acquiring a wider range of new renewable energy sources. In 2002, City Light brought Seattle's first wind-generated electricity to its customers.

CONSERVATION AND DEMAND MANAGEMENT

City Light has been a forerunner in conservation and demand side management. In 2001-2002, load analysis studies for Downtown reviewed various strategies for gaining capacity, including distributed generation, renewable energy, solar power, wind power, demand peak shaving, and energy conservation. While these strategies may offer incremental positive benefits, a number of technical issues continue to be a challenge. At least for the near future, implementing further strategies of this type would not be sufficient to deal with projected electrical loads on the Downtown Network.

IMPACTS

Alternative 1 – High End Height and Density Increase

GROWTH SCENARIOS AND CAPACITY IMPACTS

Comparability between EIS projected commercial growth rate and City Light electrical load growth rate: The EIS growth scenario projects commercial development trends on a year-by-year basis for the next 20 years. The amount of commercial growth predicted by this model fluctuates between 0% and 6% per year, with a 20-year average of 2.1% per year. This is relatively comparable to City Light's base economic forecast assumption of 2% annual load growth. This is a rough indicator that the amount of growth studied in the EIS is generally consistent with City Light projections.

Real estate analyses for this EIS conclude that "*changes to zoning, in and of themselves, do not change the supply and demand cycles. In other words, increasing commercial densities does not necessarily lead to more development occurring Downtown. However, changes in zoning will influence where development occurs and the size and density of the buildings developed*." Thus capacity needs to be available to serve areas of growth. If several new large projects with significant energy demands are located in a concentrated area, this could challenge available electrical infrastructure capacity. These limitations and needed improvements will be closely monitored on an ongoing basis and addressed in City Light's Capacity Plan in 2004.

A new substation needs to be energized by 2012, and significant planning and construction over 7-8 years is needed: Under the assumptions in the 2002 R.W. Beck report, a new Downtown substation needs to be energized by 2012. Permitting, transmission and design/construction work required to build and energize a new substation will take 7-8 years (to 2010 or 2011 if started immediately). Exact timing

[3] This is a comparison to the baseline in the standard, not to current practice in Seattle, Washington State or the State's Energy Code. Actual energy savings are not estimated because of past variation in design practices and variation in building types.

of the need for a new substation will vary to some degree depending on several factors. The R.W. Beck report identifies the following factors that could accelerate or delay growth in electrical loads over time:

Factors potentially accelerating load growth

Higher than forecast economic activity (1 to 3 years acceleration).
Greater than expected high-density loads such as server hotels (7 new server hotels would accelerate this date by 2 to 3 years).
A policy decision that greater redundancy is required.

Factors potentially delaying load growth

Lower than forecast economic activity (3 to 4 year delay).
Greater than expected energy efficiency improvements (1 to 2 year delay).
Greater acceptance of demand-side management strategies such as peak load shifting (1 to 2 year delay).

All of the above comments apply to all Alternatives. The following comment applies only to Alternative 1.

Limits of capacity in a portion of the Denny Triangle: The portion of the Denny Triangle bounded by 8th Avenue, Westlake, Denny Way and Interstate 5 is served by the Broad East subnetwork. This subnetwork is already accommodating emerging developments. Higher zoning height/density limits in this area could result in more immediate capacity limitations due to increased commercial load. City Light will address needed short-term and long-term infrastructure improvements in its capacity plan.

Cumulative Impacts

Future growth over the next 10 to 20 years is likely to occur across several economic sectors, including the high-tech and biotech sectors. Regional and national economic trends will likely influence the overall amount of employment growth. Demand for office space will likely continue to grow in Downtown, in high-tech as well as other employment sectors. South Lake Union, adjacent to Downtown, may also continue to attract high-tech and biotech growth due to the tendency of research/development efforts to cluster around centers of intellectual resources. Because separate distribution systems serve these two neighborhoods, these areas will not compete for use of the same substation transformer and distribution capacity. Depending upon the amount and location of load growth within this timeframe, there could be competition for transmission capacity, capital funds and labor resources.

Alternative 2 – Concentrated Office Core

GROWTH SCENARIOS AND CAPACITY IMPACTS

The total amount of growth predicted to occur over 20 years under Alternative 2 would be nearly the same as predicted for Alternative 1. The predicted pattern of growth would also be very similar, with a majority of redeveloped properties located within the Denny Triangle neighborhood. Existing zoning would remain unchanged in areas near Denny Way, in the 1st Avenue and Western Avenue vicinity, and the southern edge of Belltown. Under Alternative 2, the overall commercial and residential development capacity would be approximately 12% less than under Alternative 1.

Given the similarities in the amount and location of predicted 20-year growth, the overall energy impacts of Alternative 2 would be approximately similar to impacts of Alternative 1. However, slightly less-intensive zoning changes in portions of the Denny Triangle east of 8th Avenue could reduce the worst-

case potential for electrical infrastructure impacts in that portion of the Denny Triangle. The potential for large load impacts under Alternative 2 would be essentially the same as under Alternative 1.

Alternative 3 – Residential Emphasis

GROWTH SCENARIOS AND CAPACITY IMPACTS

The total amount of growth predicted to occur over 20 years under Alternative 3 would be nearly the same as predicted for Alternative 1. The predicted pattern of growth would also be roughly similar, with a majority of redeveloped properties located within the Denny Triangle neighborhood. However, zoning changes in portions of Denny Triangle, the 1st Avenue and Western Avenue vicinity and the edge of Belltown would maintain lower commercial densities and place more emphasis on housing production. Under Alternative 3, the overall commercial development capacity would be approximately 20% less and residential capacity 3% less than under Alternative 1.

Given the differences in zoning emphasis, the overall energy impacts of Alternative 3 would be somewhat less than impacts of Alternative 1. Alternative 3's concept of lower commercial densities and greater residential emphasis in portions of the Denny Triangle east of 8th Avenue would reduce the magnitude of impacts on the electrical system compared to Alternatives 1 and 2, because residential uses would generate lower electrical demands than commercial uses. Alternative 3's impacts would even be lower than impacts of Alternative 4 (No Action). The potential for large load impacts would be similar to impacts of other alternatives.

Alternative 4 – No Action

GROWTH SCENARIOS AND CAPACITY IMPACTS

The total amount of growth predicted to occur over 20 years under Alternative 4 would be nearly the same as predicted for Alternative 1. The predicted pattern of growth would be similar to Alternative 1, but may spread over a few more properties in the Commercial Core vicinity. Under Alternative 4, the overall commercial development capacity would be approximately 25% less and residential capacity 19% less than under Alternative 1.

Given the shades of differences in the pattern of predicted 20-year growth, the overall energy impacts of Alternative 4 would be somewhat less than Alternatives 1 and 2, but greater than Alternative 3. Permissible commercial densities within most of the Denny Triangle would be less than Alternative 1. The potential for large load impacts on energy demands under Alternative 4 would be similar to Alternative 1. Under all alternatives, a new Downtown substation will be needed.

MITIGATION STRATEGIES

Proposed Mitigation Strategies

Given the significant adverse impacts identified in this section, approval of zoning changes should be accompanied by a combination of mitigation strategies that would adequately address the identified significant impacts. These could be selected from the following range of possible strategies, or other strategies not yet identified.

Implement recommendations of City Light's Capacity Plan: Complete City Light's Capacity Plan in 2004 and implement the recommendations that result from that Plan.

Strategically address high-energy-demanding uses: A combined land use and energy strategy could be developed to address impacts of new large loads or staged new large loads in the Downtown.

Incorporate LEED into the Downtown Density Bonus program: Incentives or requirements to use the LEED system's Green Building energy efficiency strategy could promote better energy conservation in future development. In response to the City Council's Resolution 30280, City staff have discussed integration of sustainable building incentives into the building permitting process, and integration of the LEED system into the Downtown density bonus system. The LEED system could be required for participation in the Downtown Density Bonus program as a mitigation strategy to help offset impacts on the electrical system.

A particular threshold of performance in the energy category could be established. Consistent with the City's own internal sustainable building policy, this requirement could be set as a minimum achievement in energy efficiency.

A minimum overall LEED performance could also be set in order to capture other benefits of the program, such as mitigating increased demands on water and wastewater infrastructure, reduction of stormwater impacts, and mitigation of global climate effects. If this was implemented, a development project would go through the certification process administered nationally by the US Green Building Council. A copy of the certification package could be submitted to the City to endorse the required participation in the program. Since LEED certification is not fulfilled until after construction, a strategy would be needed to handle projects that did not meet performance targets when built.

Incorporate LEED into Land Use Code, Design Review, or Building Code: Alternatively, the City could seek to incorporate elements of the LEED system into the Land Use Code, the design review guidelines, and potentially the Building Code. Measures and tools developed as part of LEED would be required or encouraged to be met before a project receives its land use approval. For example, the Downtown design guidelines could be amended to include guidelines on floorplate design, encouraging designs that would allow natural light to intrude to the center of buildings, potentially reducing the amount of lighting required during the day.

More efficient design of buildings' electrical systems: Developers could be required to design their buildings' electrical services so that their average monthly power factor is no less than 0.97. The present financial penalty for having a power factor below 0.97 could be increased to encourage installation of better equipment and/or power factor correction equipment.

Coordination with the building permit process: DPD and City Light will continue their efforts to work with developers during the pre-application process, before issuing building permits.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

With implementation of recommended mitigation strategies, significant unavoidable adverse energy impacts are unlikely to occur.